

WHAT IS CLAIMED IS:

1. A method of manufacturing a semiconductor device, comprising the steps of:

forming a first semiconductor layer on a  
5 substrate;

forming a first transparent electroconductive layer on the first semiconductor layer; and

forming a second semiconductor layer on the first transparent electroconductive layer,

10 the method further comprising executing passivation treatment on defects in the first semiconductor layer before the forming step of the second semiconductor layer.

15 2. The method of manufacturing a semiconductor device according to claim 1, wherein the passivation treatment is, by utilizing a sputtering method adapted to control a bias potential of the substrate, to form the first transparent electroconductive layer  
20 only on areas other than the defective areas in the first semiconductor layer.

3. The method of manufacturing a semiconductor device according to claim 1, wherein the passivation  
25 treatment is, after the forming step of the first transparent electroconductive layer, to passivate the first transparent electroconductive layer overlying

the defective areas in the first semiconductor layer.

4. The method of manufacturing a semiconductor device according to claim 1, wherein the passivation  
5 treatment is, after the forming step of the first transparent electroconductive layer by utilizing a sputtering method adapted to control a bias potential of the substrate, to passivate the first transparent electroconductive layer overlying the defective areas  
10 in the first semiconductor layer.

5. The method of manufacturing a semiconductor device according to claim 3, wherein the passivation treatment is to remove the first transparent  
15 electroconductive layer overlying the defective areas in the first semiconductor layer.

6. The method of manufacturing a semiconductor device according to claim 3, wherein the passivation  
20 treatment is to increase the resistance of the first transparent electroconductive layer overlying the defective areas in the first semiconductor layer.

7. The method of manufacturing a semiconductor  
25 device according to claim 5, wherein the passivation treatment is executed by applying a voltage to the substrate.

8. The method of manufacturing a semiconductor device according to claim 5, wherein the passivation treatment is executed by applying a voltage to the substrate while the substrate is dipped into  
5 electrolyte.

9. A method of manufacturing a semiconductor device, comprising:

forming a first semiconductor layer on a  
10 substrate;  
forming a first transparent electroconductive layer on the first semiconductor layer;  
forming a second semiconductor layer on the first transparent electroconductive layer; and  
15 forming a second transparent electroconductive layer on the second semiconductor layer,  
the method further comprising the steps of:  
executing passivation treatment on defects in the first semiconductor layer before formation of the  
20 second semiconductor layer; and  
executing passivation treatment on defects in the second semiconductor layer.

10. The method of manufacturing a semiconductor  
25 device according to claim 9, wherein the passivation treatment for the defects in the first semiconductor layer is, by utilizing a sputtering method adapted to

control a bias potential of the substrate, to form the first transparent electroconductive layer only on areas other than the defective areas in the first semiconductor layer, and

5           the passivation treatment for the defects in the second semiconductor layer is, by utilizing a sputtering method adapted to control a bias potential of the substrate, to form the second electroconductive layer only on areas other than the  
10 defective areas in the second semiconductor layer.

11. The method of manufacturing a semiconductor device according to claim 9, wherein the passivation treatment for the defects in the first semiconductor  
15 layer is, by utilizing a sputtering method adapted to control a bias potential of the substrate, to form the first transparent electroconductive layer only on areas other than the defective areas in the first semiconductor layer, and

20           the passivation treatment for the defects in the second semiconductor layer is, after the formation of the second transparent electroconductive layer, to passivate the second electroconductive layer overlying the defective areas in the second  
25 semiconductor layer.

12. The method of manufacturing a semiconductor

device according to claim 9, wherein the passivation treatment for the defects in the first semiconductor layer is, by utilizing a sputtering method adapted to control a bias potential of the substrate, to form  
5 the first transparent electroconductive layer only on areas other than the defective areas in the first semiconductor layer, and

the passivation treatment for the defects in the second semiconductor layer is, after the  
10 formation of the second transparent electroconductive layer by utilizing a sputtering method adapted to control a bias potential of the substrate, to passivate the second electroconductive layer overlying the defective areas in the second  
15 semiconductor layer.

13. The method of manufacturing a semiconductor device according to claim 9, wherein the passivation treatment for the defects in the first semiconductor  
20 layer is, after the forming step of the first transparent electroconductive layer, to passivate the first transparent electroconductive layer overlying the defective areas in the first semiconductor layer, and

25 the passivation treatment for the defects in the second semiconductor layer is, by utilizing a sputtering method adapted to control a bias potential

of the substrate, to form the second electroconductive layer only on areas other than the defective areas in the second semiconductor layer.

5           14. The method of manufacturing a semiconductor device according to claim 9, wherein the passivation treatment for the defects in the first semiconductor layer is, after the forming step of the first transparent electroconductive layer, to passivate the  
10 first transparent electroconductive layer overlying the defective areas in the first semiconductor layer, and

the passivation treatment for the defects in the second semiconductor layer is, after the forming  
15 step of the second transparent electroconductive layer, to passivate the second electroconductive layer overlying the defective areas in the second semiconductor layer.

20           15. The method of manufacturing a semiconductor device according to claim 9, wherein the passivation treatment for the defects in the first semiconductor layer is, after the forming step of the first transparent electroconductive layer, to passivate the  
25 first transparent electroconductive layer overlying the defective areas in the first semiconductor layer, and

the passivation treatment for the defects in the second semiconductor layer is, after the second transparent electroconductive layer is formed by utilizing a sputtering method adapted to control a bias potential of the substrate, to passivate the second electroconductive layer overlying the defective areas in the second semiconductor layer.

16. The method of manufacturing a semiconductor device according to claim 9, wherein the passivation treatment for the defects in the first semiconductor layer is, after the first transparent electroconductive layer is formed by utilizing a sputtering method adapted to control a bias potential of the substrate, to passivate the first transparent electroconductive layer overlying the defective areas in the first semiconductor layer, and

the passivation treatment for the defects in the second semiconductor layer is, by utilizing a sputtering method adapted to control a bias potential of the substrate, to form the second electroconductive layer overlying the defective areas in the second semiconductor layer.

17. The method of manufacturing a semiconductor device according to claim 9, wherein the passivation treatment for the defects in the first semiconductor

layer is, after the first transparent  
electroconductive layer is formed by utilizing a  
sputtering method adapted to control a bias potential  
of the substrate, to passivate the first transparent  
5 electroconductive layer overlying the defective areas  
in the first semiconductor layer, and

the passivation treatment for the defects in  
the second semiconductor layer is, after the forming  
step of the second transparent electroconductive  
10 layer, to passivate the second electroconductive  
layer overlying the defective areas in the second  
semiconductor layer.

18. The method of manufacturing a semiconductor  
15 device according to claim 9, wherein the passivation  
treatment for the defects in the first semiconductor  
layer is, after the first transparent  
electroconductive layer is formed by utilizing a  
sputtering method adapted to control a bias potential  
20 of the substrate, to passivate the first transparent  
electroconductive layer overlying the defective areas  
in the first semiconductor layer, and

the passivation treatment for the defects in  
the second semiconductor layer is, after the second  
25 transparent electroconductive layer is formed by  
utilizing a sputtering method adapted to control a  
bias potential of the substrate, to passivate the



second electroconductive layer overlying the defective areas in the second semiconductor layer.

19. The method of manufacturing a semiconductor  
5 device according to claim 2, wherein in the sputtering method adapted to control a bias potential of a substrate, a voltage is applied from a first power supply to a target, and a voltage is applied from a second power supply to the substrate, to  
10 control the bias potentials independently of each other.

20. A method of manufacturing a semiconductor device, comprising the steps of:  
15 forming a first semiconductor layer on a substrate;  
forming a first transparent electroconductive layer on the first semiconductor layer, and  
forming a second semiconductor layer on the  
20 first transparent electroconductive layer; in this order,  
wherein the forming step of the first transparent electroconductive layer is carried out by the process comprising the steps of:,  
25 charging the substrate having the first semiconductor layer thereon to a negative potential;  
applying ions to a sputtering target while the

substrate is charged to the negative potential; and  
forming a sputtering film on the first  
semiconductor layer as a first transparent  
electroconductive layer.

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21. A semiconductor device, comprising at  
least:

a substrate;

10 a first semiconductor layer formed on the  
substrate and having defective areas;

a first transparent electroconductive layer  
formed on areas other than the defective areas of the  
first semiconductor layer; and

15 a second semiconductor layer formed on the  
first transparent electroconductive layer.